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# Preface

Semi-infinite programming (SIP) deals with optimization problems in which either the number of decision variables or the number of constraint is finite. Hence, SIP can be seen simultaneously as an extension of the ordinary mathematical programming problem or a particular case of an infinite-dimensional optimization model. The SIP problem naturally arises in an abundant number of applications in different fields of mathematics, as approximation theory, optimal control, as well as in economics and engineering. Because of this, during the last five decades SIP has known a tremendous development, and more than 1000 articles and 10 books have been published on the theory, numerical methods and applications (see, for instance an extended SIP bibliography in http://www.home.math.utwente.nl/stillgj/sip.html, where the reader can also find the references in this preface).

Although the origins of SIP are related to Chebyshev approximation, the classical work of Haar on linear semi-infinite systems, and the Fritz John optimality condition, the term SIP was coined in 1962 by Charnes, Cooper, and Kortanek in a paper devoted to duality in linear SIP. These scientists, specially the last one, contributed significantly to the development of the first applications of SIP in economics, game theory, mechanics, and statistical inference. Gustafson and Kortanek proposed, during the first 1970s, the first numerical methods for SIP models arising in applications.

The publication since the late 1970s of several books (or edited books) dealing totally or partially with SIP, and including both theory and numerical aspects, by Hettich (79), Fiacco and Kortanek (83), Tichatschke (81), Glashoff and Gustafson (83), Hettich and Zencke (82), Brosowski (82), Goberna and Lopez (98), etc., as well as two superb surveys by Hettich and Kortanek (93) and Polak (97), converted SIP in a mature and independent subfield in optimization.

Hettich and Still started in 1986 to approach the generalized SIP (GSIP, in brief), where the index set of the constraint system depends on the own state variables. Due to its many applications in fields like robotics, geometrical design, etc., GSIP became immediately a topic of intensive research.

Given the increasing scientific interest of SIP, and the many papers published every year on the topic, conference streams and workshops have been regularly organized in order to communicate the recent advances in the field. In 1996 and 1999, two workshops were held in Cottbus (Germany) and Alicante (Spain), respectively. In August 24–27, 2005, the latest SIP workshop was held in Tainan (Taiwan), organized by the National Center for Theoretical Sciences. More than 30 prestigious specialists attended this event, which allowed them to update the state of the art of SIP and to bring the powerful SIP tools close enough to the potential researchers in different scientific and technological fields.

The main goal of this special issue of JCAM is to provide a collection of relevant articles that represent a substantial part of the contemporary body of knowledge in SIP. We are glad that leading researchers have contributed to this special issue, and it is our hope that students and wide ranged scientists will find in it very useful information, providing them an incentive strong enough for further developments in the field.

We are also thankful to all the authors for their valuable contributions and to the referees of the articles for their qualified reports.

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